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ABSTRACT

The intent of this study was to identify predictor variables for pass/fail status on the Elementary Professional Development Examination for Certification of Educators in Texas (ExCET) for preservice teachers at a university in South Texas. Logistic regression was used to investigate the dependency between the predictors and the ExCET pass/fail rates. Samples of 120 and 136 elementary preservice teachers were drawn from 1999 and 2001 classes at a university where the enrollment is largely Hispanic American. The dependent variable, the ExCET scores, and the independent variables of Texas Academic Skills Program scores (TASP), American College Testing Program scores, overall grade point average (GPA), Benchmark ExCET, and ExCET were considered. Results of the logistic regression analysis shows that ExCET pass/fail outcomes for elementary preservice teachers in the professional development area can be predicted with 71.7% accuracy by using the variables TASP reading scores and GPA scores, at least for Hispanic students attending universities in South Texas. Implications for increasing the numbers of students who pass the ExCET are discussed. An appendix contains tables of study data. (Contains 26 tables.) (SLD)

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TEACHER CERTIFICATION TESTS: VARIABLES THAT PREDICT PASS/FAIL STATUS ON ELEMENTARY PROFESSIONAL DEVELOPMENT EXAMINATION FOR PRESERVICE TEACHERS

Introduction

The topic of teacher certification tests has attracted considerable attention from educational researchers, teachers, school administrators, and policy makers (Jaeger, 1988; Cornett, 1987; Chambers, Munday, Sienty, and Justice, 1999; White, Burke and Hodges, 1994). A number of states have modified their teacher education programs. For example, Texas replaced the Bachelor of Education Degree with a Bachelor of Interdisciplinary Studies Degree, a degree that requires an academic major along with 18 semester hours of education courses (including student teaching) and, for certification, a passing grade on each of a series of comprehensive examinations testing both subject and professional knowledge. These certification tests, known as the ExCET (Examination for Certification of Educators in Texas), test for mastery in the competencies spelled out in the ExCET Preparation Manual. Because education institutions are under pressure to increase the passing rate of first time test takers, it behooves them to identify variables that predict success on the ExCET. Identifying variables is particularly important for education institutions housing large numbers of minority students as the failure rate for these students is sometimes double that of others (Cornett, 1987). The quality of the teacher education program is of utmost importance.

Previous studies conducted at a university in South Texas where the student population is approximately 87% Hispanic examined the Secondary Professional Development ExCET, using logistic regression analysis or linear regression (Poelzer, Zeng, and Simonsson, 2000; Simonsson, Poelzer, and Zeng, 2000). Other researchers have also used logistic regression analysis to predict academic performance in higher education (Zhao, 1999; Livingston, 2000).

Purpose and Perspectives of the Study

Research to identify variables predicting success on teacher certification tests suggests that critical thinking plays a key role in the students' success on teacher certification tests (Chambers et al., 1999). Also, the combined effect of reading ability, grade point average, age, gender and Texas Academic Skills Program (TASP) math, reading, and writing scores can be used as predictors (Chambers et al., 1999). In addition, White et al. (1994) found that both SAT and grade point average predict success on the professional development test of the ExCET. And Poelzer, Zeng, and Simonsson (2000) identified additional variables that predict success for secondary school pre-service Hispanic students: practice (benchmark) ExCET test scores, TASP reading scores, ACT composite scores, and ACT English scores. Identification of such variables could influence administrator formulation of policies regarding accountability issues, faculty instructional strategies and content selection in the courses, and student performance on teacher certification tests. Knowledge and information on how to select or prepare students effectively for teacher certification is central to educators in both higher education and school districts. The intent of this study was to identify predictor variables for pass/fail status on Elementary Professional Development ExCET for pre-service teachers at the same university in South Texas.

Logistic regression was utilized to investigate the dependency between the predictors and the ExCET pass/fail status.

Method

Data Sources

In this study, two samples of elementary education pre-service teachers were drawn from the College of Education's academic records: ExCET data, April 1999 and October 2001. The TASP, ACT and overall GPA scores were collected from the university's academic records office, and the benchmark scores, from the College of Education's ExCET office. The April 1999 sample consisted of 120 participants (102 females, 18 males), the October 2001 sample, 136 participants (112 females, 24 males).

Measures of Variables

Guided by previous success in predicting the pass/fail status on the secondary professional development ExCET, linear regression and logistic regression analyses were utilized for predicting the elementary professional development ExCET scores and pass/fail status. The dependent variable, the elementary professional development ExCET scores, and the following independent variables' scores were considered in the analyses: TASP (reading, math and writing), ACT (English, math, writing, social science and natural science), overall GPA, Benchmark ExCET (where applicable) and ExCET. In addition, a t-test of independence was employed to assess the effect of "Benchmarking" prior to taking the ExCET. For a description of the variables used in the study, see Table 1 (Appendix).

Analytical Approach

The SPSS for Windows Release 10.0 was used to conduct the statistical analyses. The study used significance level α=0.05 as the criterion level for determining statistical significance. A Pearson Product Moment Correlation matrix, followed by a partial correlation analysis controlling for ACT English scores, and an all-possible procedure linear regression analysis were used to assess the predictive value of the variables. To determine the variables that effectively predict pass/fail status on elementary students' ExCET, logistic regression analysis with likelihood-ratio-based forward:Wald selection was employed as the major statistical method for the study. And, to measure the effect of "Benchmarking", a t-test of independence was performed.

Results

For the 1999 data, the Pearson Product Moment Correlation shows significant correlations (p<.05) between the professional development the ExCET score and the following scores: ACT composite (r=.436), ACT English (r=.463), Overall GPA (r=.387), TASP reading (r=.320), and TASP math (r=.327) (Appendix, Table 2.1). A partial correlation, controlling for ACT English scores, results in three contributing variables correlating with the ExCET: GPA (r=.28), TASP reading (r=.26), and TASP math (r=.26) (Appendix, Table 2.2). The ACT English, GPA and TASP reading scores explain approximately 31% of the variance in the ExCET scores (Appendix, Table 4). The following linear regressions equation evolve: Predicted ExCET score = (0.823)(ACT English) + (9.008)(Overall GPA) + (0.116)(TASP reading) + 0.337. Expressed in Beta weights, the predicted ExCET score = (0.352) (ACT English) + (0.226)(Overall GPA) + (0.197)(TASP reading).

Table 5.2 indicates the logistic model has a 71.7% correct prediction rate, overall. Furthermore, it can predict the failing cases with 83.3% accuracy. Table 5.3 shows that the model Chi-square is significant (p=.000) and the value of –2 Log likelihood (-2LL) is of 124.521. Table 5.4 displays the parameter estimates for the two variables in the final model as well as their related statistics. Of the four input variables, only the two predictors TASP reading and GPA change the odds of passing the ExCET effectively. Using the GPA only in the logistic model increases the prediction for the failed cases to 89%; however, the overall prediction for the total group drops to 69%. Since our research question is focused on predicting failed cases (2/3 of the participants), the estimated conditional probability was generated, based on GPA scores (see Table 5.5). In general, it appears that one with a GPA of less than 3.0 is likely to fail. For instance, a student with GPA of 2.62 has .39 probability of passing the ExCET, meaning he/she would most likely fail the ExCET. In Table 5.5, 20 out of 22 randomly selected cases were predicted accurately.

The 2001 data show very similar results (see appendix). For the ExCET, the t-test of independence shows no significant difference between the group who did not take the benchmark test (1999) and of the group who did (2001): $t = -0.481$, df = 254, $p = 0.631$.

Discussion and Educational Importance of the Study

The results of the logistic regression analysis shows that ExCET pass/fail outcomes for elementary pre-service teachers on the professional development area can be predicted with 71.7% accuracy by using the variables TASP reading scores and GPA scores, at least for Hispanic students attending universities in South Texas. These results corroborate the finding of our previous research on the secondary professional development ExCET in terms of TASP

It suggests that raising the selection criteria in both predictor variables would result in higher proportions of students passing the ExCET on the first attempt. It has a further implication for educator administrators in that it draws attention to the importance of developing reading skills at the district level. The finding that the practice of "benchmarking" did not contribute significantly to the prediction of ExCET results raises the question as to whether more time should be spent in improving reading comprehension and reasoning skills rather than in teaching testing strategies.

Notwithstanding the fact that the restricted area of study and the type of the population do limit the generalization of the findings, the methodology is practical and has universal applications.

Further research involves extending this study to include (a) other pre-service areas such as elementary comprehensive, early childhood, special education, accelerated certification programs and, (b) other populations in the State of Texas. Ultimately, one needs to determine the predictive value of the ExCET for success of teachers in the field.

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Appendix

Table 1. Descriptive Means of Variables used to Determine Success for Elementary Preservice Teachers Professional Development Teacher Certification Exam (ExCET).

	1999 (N=120)		2001 (N=136)	
Variables	Mean	SD	Mean	SD
Overall GPA	2.8	0.24	2.93	0.29
ACT composite	14.63	3.88	14.71	3.76
ACT (English)	14.29	4.13	14.02	4.18
TASP (reading subtest)	249.49	16.49	245.11	17.37
TASP (math subtest)	246.55	18.88	238.36	17.88
ExCET (professional development)	66.19	9.67	65.63	8.93
Benchmark scores			79.68	11.53

Table 2.1. Correlation Matrix of Variables used to Determine Success for Elementary Preservice Teachers Professional Development Teacher Certification Exam (ExCET) from April 1999.

	Overall GPA	ACT comp.	TASP (reading)	TASP (math)	ACT (English)	ExCET (prof.dev.)
Overall GPA		.316**	.241**	.227**	.322**	.387**
		p=.000	p=.008	p=.002	p=.000	p=.000
ACT composite			.186*	.331**	.840**	.436*
			p=.042	p=.000	p=.000	p=.000
TASP (reading subtest)				.276**	.194*	.320**
				p=.002	p=.034	p=.000
TASP (math subtest)					.225*	.327**
					p=.013	p=.000
ACT (English)						.463**
						p=.000

* $p<.05$

Table 2.2. Correlation Matrix of Variables used to Determine Success for Elementary Preservice Teachers Professional Development Teacher Certification Exam (ExCET) from April 1999, controlling for ACT (English).

	Overall GPA	ACT comp.	TASP (reading)	TASP (math)	ExCET (prof.dev.)
Overall GPA		.088 p=.341	.1919* p=.037	.222* p=.015	.283** p=.002
ACT composite			.0437 p=.637	.268** p =.003	.098 p=.289
TASP (reading subtest)				.243** p=.008	.265** p=.004
TASP (math subtest)					.258** p=.005

* p<.05

Table 3.1. Correlation Matrix of Variables used to Determine Success for Elementary Preservice Teachers Professional Development Teacher Certification Exam (ExCET) from October 2001.

	Overall GPA	ACT comp.	TASP (reading)	TASP (math)	ACT (English)	Bench ExCET	ExCET (prof.dev.)
Overall GPA		310** p=.000	.325** p=.000	.048 p=.576	.376** p=.000	.314** p=.000	.366** p=.000
ACT composite			.340** p=.000	.312** p=.000	.830** p=.000	.371** p=.000	.458** p=.000
TASP (reading subtest)				.149 p=.084	.350** p=.000	.253** p=.003	.402** p=.000
TASP (math subtest)					.204* p=.017	.019 p=.828	.110 p=.203
ACT (English)						.377** p=.000	.476** p=.000
Benchmark ExCET							.250** p=.003

* p<.05

Table 3.2. Correlation Matrix of Variables used to Determine Success for Elementary Preservice Teachers Professional Development Teacher Certification Exam (ExCET) from October 2001, controlling for ACT (English).

	Overall GPA	ACT comp.	TASP (reading)	TASP (math)	Bench ExCET	ExCET (prof.dev.)
Overall GPA		-.003	.225**	-.013	.201*	.229**
		p=.973	*p*=.009	p=.718	*p*=.020	*p*=.007
ACT composite			.095	.261**	.112	.129
			p=.271	*p* =.002	*p*=.194	*p*=.137
TASP (reading subtest)				.084	.140	.286**
				p=.333	*p*=.105	*p*=.001
TASP (math subtest)					-.064	.015
					p=.459	*p*=.866
Bench ExCET						.087
						p=.315

* $p<.05$

Summary of Multiple Linear Regression

Table 4.1. Linear regression of ExCET on Overall GPA, ACT English, and TASP (reading subtest) for April 1999

R	R Square	Adjusted R Square	Standard Error of Est.
.566	.320	.309	8.2334

Table 4.2 Linear regression coefficients

Model	Unstandardized Coefficients		Stand. Coeff.		
	B	Standard Error	Beta Coeff.	t	Significance
Constant	.337	12.881		.026	.979
ACT English	.823	.192	.352	4.292	.000
Overall GPA	9.008	3.302	.226	2.728	.007
TASP (reading)	.116	.047	.197	2.469	.015

Summary of Logistic Regression Results for Determine Success for Elementary Preservice Teachers Professional Development Teacher Certification Exam (ExCET).

Table 5.1 Input and outcome variables

Input variables
Overall GPA
ACT (English)
TASP (reading subtest)
TASP (math subtest)
Outcome variable
Dichotomized ExCET scores (1 = "ExCET scores>=70"; 0= "ExCET scores<70")

Table 5.2 Classification Table for ExCET outcomes

Observed	Predicted		Percent Correct
	Fail	Pass	
Fail	65	13	83.3%
Pass	21	21	50.0%
	Overall		71.7%

Table 5.3 Goodness of Fit for the Regression Model

Name	Value	df	Sig.
-2 Log Likelihood	124.521		
Step Chi-square	30.866	1	.001
Block Chi-square	30.866	2	.000
Model Chi-square	10.425	2	.000

Table 5.4 Parameter Estimates for the Regression Model

Variable	B	S.E.	Wald	Df	Sig.	Exp(B)
TASP reading	.054	.015	13.505	1	.000	1.056
Overall GPA	2.940	.962	9.348	1	.002	18.919
Constant	-22.577	4.702	23.056	1	.000	

Table 5.5 Estimated conditional probability of passing ExCET, by GPA score, estimated for 22 randomly selected students who failed.

GPA	ExCET	Probability[a]	Predicted Status[b]
2.68	69.00	.38716	.00
3.34	68.00	.74708	1.00
2.82	66.00	.59702	1.00
2.80	66.00	.44124	.00
2.62	66.00	.05515	.00
2.60	65.00	.11840	.00
2.62	64.00	.16233	.00
2.77	63.00	.25654	.00
2.73	63.00	.17710	.00
2.69	60.00	.17965	.00
2.59	59.00	.09071	.00
2.87	59.00	.34534	.00
2.63	59.00	.20573	.00
2.87	58.00	.28197	.00
2.93	58.00	.20236	.00
2.80	58.00	.16741	.00
2.74	56.00	.18560	.00
2.75	56.00	.11020	.00
2.64	56.00	.18329	.00
2.69	55.00	.33166	.00
2.73	54.00	.11690	.00
2.54	44.00	.13207	.00

[a] The cut value = .50
[b] 1="Pass"; 0="Fail"

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